CLAIMS

1. Apparatus for electrical mapping of a pulmonary vein of a heart, comprising a catheter, which comprises:

a curved section comprising a single-coil position sensor, and one or more electrodes, adapted to measure an electrical property of the pulmonary vein; and

a base section having a distal end attached to a proximal end of the curved section, the base section comprising a multi-coil position sensor within 3 mm of the distal end thereof.

2. The apparatus according to claim 1, wherein the multi-coil position sensor is positioned within 1 mm of the distal end of the base section.

3. The apparatus according to claim 1, wherein the curved section comprises a material that is flexible, and maintains a substantially fixed length of the curved section.

4. The apparatus according to claim 1, wherein the curved section has an elasticity that is generally constant over at least a quarter of the curved section.

5. The apparatus according to claim 1, wherein the multi-coil position sensor comprises exactly two coils.

6. The apparatus according to claim 1, wherein the multi-coil position sensor comprises exactly three coils.

7. The apparatus according to claim 1, wherein the catheter comprises one or more ablation elements.

8. The apparatus according to claim 1, wherein at least one of the electrodes is adapted to perform ablation.

9. The apparatus according to claim 1, wherein the single-coil position sensor is positioned in a vicinity of a distal end of the curved section.

10. The apparatus according to claim 1, wherein the curved section comprises a center single-coil position sensor in a vicinity of a center thereof.

11. The apparatus according to claim 1, wherein the curved section is shaped to generally conform to a shape of an interior surface of the pulmonary vein.

12. The apparatus according to claim 1, wherein the apparatus comprises a processor, adapted to calculate respective six-dimensional position and orientation coordinates of the one or more electrodes, responsive to respective position signals generated by the single-coil and multi-coil position sensors.

13. The apparatus according to claim 1, wherein the apparatus comprises a processor, adapted to generate an electrophysiological map of the pulmonary vein responsive to respective position signals generated by the single-coil and multi-coil position sensors, and responsive to the electrical property.

14. The apparatus according to claim 1, wherein the multi-coil position sensor comprises two or more non-concentric coils.

15. The apparatus according to claim 14, wherein the two or more non-concentric coils are arranged so as to be mutually orthogonal.

16. Apparatus for electrical mapping of a pulmonary vein of a heart, comprising a catheter, which comprises:

a curved section comprising a first position sensor, capable of generating fewer than six dimensions of position and orientation information, and one or more electrodes, adapted to measure an electrical property of the pulmonary vein; and

a base section having a distal end attached to a proximal end of the curved section, the base section comprising, within 3 mm of the distal end thereof, a second position sensor, capable of generating six dimensions of position and orientation information.

17. The apparatus according to claim 16, wherein the second position sensor is positioned within 1 mm of the distal end of the base section.

18. The apparatus according to claim 16, wherein the curved section comprises a material that is flexible, and maintains a substantially fixed length of the curved section.

19. The apparatus according to claim 16, wherein the curved section has an elasticity that is generally constant over at least a quarter of the curved section.

20. The apparatus according to claim 16, wherein the catheter comprises one or more ablation elements.

21. The apparatus according to claim 16, wherein at least one of the electrodes is adapted to perform ablation.

22. The apparatus according to claim 16, wherein the first position sensor is capable of generating exactly five dimensions of position and orientation information.

23. The apparatus according to claim 16, wherein the first position sensor is positioned in a vicinity of a distal end of the curved section.

24. The apparatus according to claim 16, wherein the curved section comprises a third position sensor in a vicinity of a center thereof, capable of generating fewer than six dimensions of position and orientation information.

25. The apparatus according to claim 16, wherein the curved section is shaped to generally conform to a shape of an interior surface of the pulmonary vein.

26. The apparatus according to claim 16, wherein the apparatus comprises a processor, adapted to calculate respective six-dimensional position and orientation coordinates of the one or more electrodes, responsive to respective position signals generated by the first and second position sensors.

27. The apparatus according to claim 16, wherein the apparatus comprises a processor, adapted to generate an electrophysiological map of the pulmonary vein responsive to respective position signals generated by the first and second position sensors, and responsive to the electrical property.

28. Apparatus for electrical mapping of a pulmonary vein of a heart, comprising a catheter, which comprises:

a curved section comprising a first position sensor in a vicinity of the distal end, capable of generating fewer than six dimensions of position and orientation information, and one or more electrodes, adapted to measure an electrical property of the pulmonary vein;

a base section having a distal end attached to a proximal end of the curved section, the base section comprising, within 3 mm of the distal end thereof, a second position sensor, capable of generating six dimensions of position and orientation information; and

a processor, adapted to generate an electrophysiological map of the pulmonary vein responsive to respective position signals generated by the first and second position sensors, and responsive to the electrical property.

29. The apparatus according to claim 28, wherein the processor is adapted to calculate respective six-dimensional position and orientation coordinates of the one or more electrodes, responsive to the respective position signals.

30. Apparatus for electrical mapping of a chamber of a body of a subject, comprising a catheter, which comprises:

a curved section comprising a first position sensor, capable of generating fewer than six dimensions of position and orientation information, and one or more electrodes, adapted to measure an electrical property of the chamber; and

a base section having a distal end attached to a proximal end of the curved section, the base section comprising, within 3 mm of the distal end thereof, a second position sensor, capable of generating six dimensions of position and orientation information.

31. The apparatus according to claim 30, wherein the first position sensor is positioned in a vicinity of a distal end of the curved section.

32. The apparatus according to claim 30, wherein the curved section comprises a third position sensor in a vicinity of a center thereof, capable of generating fewer than six dimensions of position and orientation information.

33. A method for electrical mapping of a pulmonary vein of a heart, comprising:

introducing into the heart a catheter having a curved section and a base section, the base section having a distal end attached to a proximal end of the curved section;

generating, at a location on the curved section, a first position signal having fewer than six dimensions of position and orientation information, and, at a vicinity of the distal end of the base section, a second position signal having six dimensions of position and orientation information; and

measuring, at one or more locations on the curved section, an electrical property of the pulmonary vein.

34. The method according to claim 33, wherein generating the first position signal comprises generating the first position signal having exactly five dimensions of position and orientation information.

35. The method according to claim 33, wherein generating the first position signal comprises generating the first position signal at a vicinity of a distal end of the curved section.

36. The method according to claim 33, comprising generating, at a vicinity of a center of the curved section, a third position signal having fewer than six dimensions of position and orientation information.

37. The method according to claim 33, comprising calculating respective six-dimensional position and orientation coordinates of the one or more locations on the curved section at which the electrical property is measured, responsive to the first and second position signals.

38. The method according to claim 33, comprising generating an electrophysiological map of the pulmonary vein responsive to the first position signal, the second position signal, and the electrical property.

39. The method according to claim 33, wherein generating the second position signal comprises generating the second position signal at a location within 3 mm of the distal end of the base section.

40. The method according to claim 39, wherein generating the second position signal comprises generating the second position signal at a location within 1 mm of the distal end of the base section.

41. The method according to claim 33, comprising ablating tissue of the pulmonary vein responsive to the first position signal, the second position signal, and the electrical property.

42. The method according to claim 41, wherein ablating the tissue comprises determining a location of an electrical abnormality in the tissue responsive to the first position signal, the second position signal, and the electrical property, and ablating the tissue substantially at the location.

43. The method according to claim 33, wherein introducing the catheter into the heart comprises positioning the curved section within the pulmonary vein.

44. The method according to claim 43, wherein positioning the curved section within the pulmonary vein comprises positioning the base section within a left atrium of the heart.

45. The method according to claim 43, wherein positioning the curved section within the pulmonary vein comprises generally maintaining a point of attachment of the curved and base sections in a vicinity of an ostium of the pulmonary vein while mapping the pulmonary vein.

46. A method for electrical mapping of a chamber of a body of a subject, comprising:

introducing into the chamber a catheter having a curved section and a base section, the base section having a distal end attached to a proximal end of the curved section;

generating, at a location on the curved section, a first position signal having fewer than six dimensions of position and orientation information, and, at a vicinity of the distal end of the base section, a second position signal having six dimensions of position and orientation information; and

measuring, at one or more locations on the curved section, an electrical property of the chamber.

47. The method according to claim 46, wherein generating the first position signal comprises generating the first position signal at a vicinity of a distal end of the curved section.

48. The method according to claim 46, comprising generating, at a vicinity of a center of the curved section, a third position signal having fewer than six dimensions of position and orientation information.